For The Tribune.

A LEAF OF LIFE.

I.

Pilgrim through Life's pages,
Turn no farther o'er:
Oft the tempest rages,
Oft the whirlwinds roar:
Wander thou no more!

II.

Thou hast journeyed over
Many pleasant leaves:
Ah! delighted rover,
Fancy still deceives:—
False the web she weaves.

III.

Sweetly still alluring,
Hope may lead thee where
Bliss appears enduring,
And the skies look fair:—
Wanderer—beware!

IV.

In the rosy bower
Oft is heard a sigh,
Fragrant though the flower,
Tempting to the eye;
Therns are lurking nigh!

V.

'Tis a bright illusion,
Where thy feet have been
Beautiful profusion,
A deceitful sheen:
Here is Life's true scene.

VI.

On yon mountain nourished,
Rooted on its brow,
Once a tall oak flourished;
Oak of spreading bough;
Ah! where is it now?

VII.

Yesterday it towered
To the smiling skies;
Prostrate and o'erpowered,
Now how low it lies;
Fallen—not to rise!

VIII.

Ev'ry breeze of heaven
Met it with a kiss:
Tender vows were given—
Were they all for this?
Ah! heart-breaking bliss!

IX.

Loving words oft spoken,
Zephyrs told that tree;
Oft its leafy token
They have borne to me:
Faithless could they be!

X.

Shattered now, and dying,
See how they deride;
All its glories flying,
On the gusty tide:
Gone the mountain's pride!

XI.

Earthly friendship blended,
Is a fragile shell;
Truth is not intended
In its depths to dwell:
Mournful truth to tell!

XII.

Pilgrim through Life's sorrow,
Hope's deluded Dove:
Wouldst thou rest to-morrow
In the ark of Love;
Speed thy wing above! ISLANDER.

Mr. Lyell's Eighth Lecture on Geology.

[Reported for The Tribune.]

BOULDERS AND ICEBERGS.

The subject of which I shall treat to-night is what we term the *Boulder Formation*, or sometimes the Norfolk Drift. The term boulder is applied to any large mass found resting upon the superficial gravel brought from a distance. By some, chiefly the writers of the last forty years, this formation is called diluvial; because they believe that this superficial gravel, and sand, and mud, in which are found these rounded fragments of rock, have been brought thither by a rush of some mighty deluge, either at one time or at different periods. But those who have thought that they saw reason to refer a large part of this to other causes prefer the term *Drift*—as not choosing to commit themselves to any particular theory except that which is certainly known to be true, that these boulders have been *drifted*, by some means or other, to a considerable distance from the parent rocks, from which, as fragments, they have been torn. You have so many examples in this country, of these foreign rocks scattered through beds of sand and mud, that it is not necessary for me to enter upon the description of any particular localities in Europe. If you pass by the great excavations that have been made for streets in Brooklyn, you may see some forty or fifty feet in thickness of what we call rubbish, an unstratified, confused mass of clay and sand, containing fragments of rock of various kinds. This may be seen near the Navy Yard, and in all parts of the suburbs of the city. The same kind of formation may be seen in various parts of the North of Europe, as well as in a different direction in the Continent. In Europe, it is particularly noticeable in the country bordering the Baltic, beginning with Finland, and through part of Russia and Poland, to Pomerania, Prussia, and Denmark, through the lower part of Sweden. The whole country consists of land at a moderate elevation, covered, to depths that have never been pierced, with this boulder formation, sometimes a thousand feet thick, and often, indeed, still more. It contains no strata; and you would become sensible, after having made a geological survey, how very rare are unstratified rocks which are not crystalline, like granite. Sometimes we find the boulder formation, entirely unstratified, passing into another strata which is arranged in layers. The absence of fossils—of organic remains—is another characteristic which makes it difficult to decide the nature or origin of this formation;—whether it be fresh-water, formed in lakes, or a marine formation, formed in the sea—is a matter of great doubt from the absence of all organic remains. Sometimes, indeed, we have found shells and bones washed out of the older rocks; for, relatively speaking, this is a modern deposite—being strewed over other strata containing fragments of them all, and occasionally of their imbedded fossils. Sometimes, too, we find them alternately of stratified and unstratified rocks.

In tracing along this remarkable deposite through the borders of the Baltic, we sometimes find fragments of rock which must have traveled hundreds of miles from their point of departure, and, as a general thing, we shall find that they grow larger in size as we approach the region from which they were derived. This I found to be the fact in going north from the margin of the Rhine to Holstein, and Denmark, where I found fragments of Scandinavian rocks, in Sweden nine feet in diameter, and at last in Denmark sometimes forty feet in diameter; and at last in the whole country was made up of these rocks. This by tracing the stream along, we shall find that as it diminishes in size the stones continually diminish in their individual dimensions. This may be seen any where between the Thames and the Tine, and by following it out in any region you will become convinced that there has been a general drift from the north. You may travel for eight or nine hundred miles over the plains of Russia, and you will find these *Erratics*, as they are called, associated to such an extent with the rocks in the neighborhood, or immediately subjacent, that they have acquired the color and mineralogical character of the rocks of each country. If, for example, you trace the boulders to the red sandstone of New Jersey, you will find them red. So at Brooklyn, you will find that in great part they are red. Yet here in the red base you find scattered fragments of the trap of the Palisades, huge masses of granite from the Highlands, and some of the green serpentine of Hoboken, all mixed together, and yet the whole reddened by the colors and marked by the character of the adjoining sandstone. So in Europe, the boulders are white in the chalk of Scandinavia; black in the carboniferous formation near Edinburgh, where the bituminous shale of the coal formation enters largely into their composition. Sometimes you find them entirely angular, as if they had not suffered any of that mechanical rubbing against adjoining rocks, or against each other, which has perfectly rounded other masses equally large. Some of these are so large that it is difficult to imagine that any force of water, which is the agent usually assigned, could be sufficient to roll them over and over as is necessary. Take some of the gneiss for instance: the edges of some huge masses have been cut off, so that the whole is as perfectly rounded as any of the smaller pebbles. Oftentimes, too, these large boulders have been carried across seas—as from the Scandinavian rocks to the south side of the Baltic. We have them too, perched upon the Jura peaks, having evidently been carried from the higher Alps over a valley fifty miles wide, and deposited upon fossiliferous limestone rocks, which have nothing in common with those of the Alps. This is the kind of appearance which has so perplexed Geologists, and to explain which, shall be one purpose of this evening's lecture.

I will first, however, allude to one other appearance which distinguishes the boulder formation.—When it rests upon hard rocks—rocks which are capable of taking and retaining a polish—rocks which have not wasted away by disintegration—we find, upon removing the sand, &c. the solid rock below sometimes polished so as almost to answer the purpose of a looking-glass; at other times we find it scratched and ridged with long parallel stripes, perfectly straight for hundreds of yards, and sometimes for a quarter of a mile, occasionally deviating from being parallel to each other, but still retaining the same general direction from north to south, or sometimes 20 or 25 degrees towards the east or west of that direction. This is evidently a common characteristic of these erratics; and any theory advanced to explain them must comprehend that appearance.

Another grand fact which is now established respecting their geographical distribution is, that they are found in the Northern Hemisphere, both in Europe and this country, extending from the pole, and they diminish in quantity as they approach the warmer and equatorial regions, and at length disappear when we come near the tropics. We find them in Europe from the north of Sweden and Norway to the coast of England, in latitude 50°. We find them here still farther south, but the Long Island deposite is one of the last grand deposites, and that on the Susquehanna is, I believe, the most southerly; and in traveling toward Georgia, or even on the James river and the Potomac, you will be struck with the absence of these large erratic fragments. It is the same in Russia, in traveling from north to south; and it is only when there is a chain of mountains like the Alps, in latitude 46°, that any exception is observed. From these mountains, as from the Jura chain, these boulders seem to radiate as from a centre. You may see them traveled to Lombardy and toward the Italian side. Even in the Grampian mountains of Scotland, you may see them scattered over the hills on every side; so also with the small Cumberland chain. Thus, mountain chains seem to have exerted the same kind of influence as the poles; for this general theory is found to be true, not only of the north pole, but also of the south. When you pass from the southern part of the United States through Mexico to Peru, at Quito you find no boulders, except at the foot of some mountain chain, where we may easily suppose the melted snow and other causes sufficiently obvious, account for their presence. Passing to Chili, it is not till you reach latitude 41° that you begin again to meet these boulders, and then they continue to increase to Terra del Fuego, where they are as magnificent in their developement as in New England or in Sweden.

Another very remarkable appearance in regard to the stratification of this formation, is the contortion and disturbance of some of the beds. In parts of the strata in Scotland, for example, you find masses of the unstratified boulder with pebbles below of various kinds, as fragments of granite, gneiss, &c. in which parts shall be twisted so that a vertical section would pass through the same bed three times. You find alternate layers, first pebbles of a particular kind and color; then sand, then loam, and then gravel—all loose, but so that you may trace the same bed for several yards, one layer being deposited above another in a nearly horizontal position; and we find them sometimes folded together—bent back upon themselves. This appearance was of a most perplexing kind, and evidently implied a lateral thrust by which the pliant beds were brought into the folded position, though those below had suffered no disturbance.

In some cases we have a mass of chalk resting on another bed, in which one has been pushed out of its original position, and the gravel and sand folded around it. In other cases, as in part of the northern coast of England, for twenty miles this unstratified *till*, as it is locally called in Scotland, is covered with a layer of horizontal loam in which are curved strata. This folding and bending of the beds in a circle sometimes, has been effected, but the beneath harder layers below are not at all disturbed; so that it cannot be a motion from below which has caused it—a subterranean upheaval or subsidence, which I have before explained, caused by volcanic action, by which we explain mountain chains, &c. This cannot be introduced here, because in that case the lower beds would have been disturbed as much as the higher. This may be seen in the section laid open in Brooklyn; some of the contortions there have been so violent as some on the Norfolk coast of England and Scotland; but the same general disturbance may be observed.

As to the age of these boulders, you find them both here and in Europe, standing over rocks all of the most modern tertiary strata. I had an opportunity in Sweden of showing how modern some of the erratics are, by finding fragments of gneiss sixteen feet in diameter, resting upon a layer of sand; then came a bed of blue marl, containing an immense number of shells of the eatable muscle, from which the blue color of the marl is derived. That muscle is now a living species in the Baltic and is found at Upsala, near the ancient University.—Several other shells are also found peculiar to the Baltic. The water of the Baltic contains only one-fourth part as much salt as the water of the ocean; and the shells found in its brackish waters, though not of different species from those of the ocean, are yet of a dwarfish form, and of a different shape from those that live in the sea. There are also found freshwater shells, which have been brought down by rivers. We may observe, then, how very modern is the transportation of some of these blocks; for not only do we trace them to the times when those species existed the same as those which now live, but when they lived placed under those peculiar geographical relations which have modified the character of the waters.

I do not say that they are all as modern as that, for some of them contain shells that are partly extinct, or at any rate which do not live in the same region. In the St. Lawrence, Capt. Bayfield came across boulders containing a small assemblage of shells which he sent to me many years ago; and Dr. Beck, a Danish Geologist, observed that there were fauna more ancient than those from the Baltic, which I received at the same time. There was a small number of species peculiar to the Southern regions, and the same as are chiefly found in Greenland and other districts near the Pole, as if the country had formerly been colder and the boulders had been dropped down by icebergs; for Capt. Bayfield frequently saw immense rocks carried by icebergs and let down, deposited with strata containing shells the same as those I spoke of in treating of the Niagara district. Thus we arrive at the conclusion that this boulder formation is one of the most modern deposites geologically considered—sometimes extremely modern, and in other points ascending a little higher, just to the period when the same shells existed, nearly all of them belonging to living species: the newer Pliocene period as I have styled it—the period when perhaps 90 out of the hundred shells found are of living species. Down to the latter part of this newer Pliocene period it appears that these erratics extend. We have to account then for this formation being of such vast thickness and unstratified; for rocks having been transferred hundreds of miles over lakes and valleys; for their being nearly non-fossiliferous; for their being found chiefly in the Arctic and Antarctic regions or near mountain chains; and to explain how they are so often found contorted and disturbed while the strata they overlie are still horizontal.

In the hope to explain the greater part of these phenomena, I propose first to treat of *Glaciers*, and then of *Icebergs*. You are aware that in lofty mountains, especially in the high latitudes, the snow never disappears during the whole year.—There is constantly falling snow which the summer heat is never sufficient to melt; and in Switzerland where the Alps are three miles in hight above the level of the sea, although in latitude 46°, their peaks are covered with perpetual snow; which comes down and fills the valley for ten or fifteen miles: then this ice becomes consolidated, being melted during the day and frozen in the night—so that it is pushed down towards the valley to a point 3000 feet above the level, where the heat becomes so great as to arrest its progress, and it melts, and gives rise oftentimes to a considerable stream of water. The cause of the motion of these glaciers has been a matter of considerable controversy. Gravity is admitted on all hands to be one considerable cause. It is suggested by Saussure, and by the earlier writers is believed to be the principal cause; but this is denied by M. Agassiz in the history of his late exploration of the Alps.—That this snow, if it goes on accumulating upon the mountains which are so steep, will by its own gravity fall down, is unquestionable. You see this to be the case in *avalanches*, as they called—sliding down of large masses of snow in warm weather, which continues until the valley is choked by this descending mass, which crushes the trees and vegetation that lie in its path. These become of such enormous size that they are sometimes 100 or 200 feet thick, and in particular places 500 or 600, though it is supposed now that 120 or 130 feet expresses their average depth. In Switzerland, where the glaciers of the Arve, the Lauter Arve, and the Shrecken meet, the former being merged in the other, along the middle is a remarkable ridge of rocks—many of them angular and some rounded. Now the first question is, how came these blocks in the middle of the valley where it is two or three miles wide? The glaciers descend from the region of perpetual snow to a hight of, say 8000 feet above the level of the sea. How came all these rocks in the middle? You might imagine that from the steep sides there would be fragments detached.—Avalanches might cause this, or frost penetrating the rents and freezing the water, would occasionally force them out and cause the rocks to descend. Sometimes lightning strikes the Alpine peaks, and shivers off large masses of rocks which descend. So that we should not be puzzled to find along the base of lofty cliffs two, three or four thousand feet high, these fragments of rock. This would be perfectly intelligible. But how should they get into the middle of the valley, and why are there five distinct parallel ridges of these stones? Saussure was at first completely baffled in accounting for this. But having once found the explanation, it was so easy that it became surprising how it could have been missed.

Prof. Agassiz found in exploring the higher regions that this was a *necessary consequence* of the junction of the two glaciers. It is easy to see why these lateral *moraines*, as they are called, should exist—the rocky fragments being deposited along these glaciers by their rubbing against the sides of the mountains. But suppose one of these immense masses of ice to be descending the valley of the Arve; and here comes a tributary to join it from the Lauter Arve—the rocks instead of being deposited in lateral moraines by rubbing against the mountain sides will be brought into the middle of these two united frozen rivers, thus forming a central or medial moraine. Now as the glacier moves along, (and in a hot day you may see the motion daily—although an inch, or perhaps half an inch an hour would be a rapid movement,)—you may see sometimes fragments falling down—rubbing one against the other, and great rents often traverse the ice with a noise like thunder. By this rubbing against the sides of the mountain the rocks become rounded. Many of the fragments fall through the fissures to the bottom, and some are caught in the middle—the fissure penetrating only twenty or thirty feet. Sometimes, however, they fall to the bottom, and then the ice resting upon them grinds them along the rock, which becomes polished—those at least capable of receiving a polish—and scratched and furrowed as we afterward find it. All this may be seen by the occasional melting back of the glacier. So at the termination of the glacier it presents a beautiful green arched cavern, out of which a torrent of water rushes down the valley. Frequently the glacier melts back from the extremity, and thus gives an opportunity to see what has taken place under it, and you will see the bottom oftentimes most beautifully polished. In some of the boulders you will find quartz pebbles, and these have scratched and made furrows upon the limestone and other rock along which they have moved—just as a diamond scratches glass.—In other places you will find still deeper furrows nearly parallel to each other. You will also see—as I have had occasion to refer to the prodigious power of these ice mountains—rocks that have been ground down to the finest impalpable powder; and nothing can exceed the fineness of this mud which is formed from the powder thus produced by these masses of ice one or two hundred feet thick, equal in weight to five and twenty or even fifty feet of solid rock.

The downward motion of the glaciers is partly due to gravity. But Prof. Agassiz says that still more is due to the alternate melting and freezing of the water. The ice is in fact a great sponge and not only may you see water in the ice at any time held up in the clefts—as many of you who have traveled in Switzerland can testify—but the whole surface is a spongy mass which imbibes the water during the day, which every night is frozen by the same frosts, and thus occurs a universal dilatation of the whole mass; the water in all the rents freezing causes an expansion, and as this cannot push aside the mountains on the flanks, the only vent for the force is downward—in which direction it has the effect to force the huge mass down at the rate of one, two, three or four inches an hour, according to the heat of the summer and the amount of alternate melting and freezing that goes on, and also according to the farther distance which the glaciers have reached. I may mention that every one of the moraines between the central one and the sides is produced just like the large one—by the junction of the tributaries which come one after another down for many miles. Thus the different moraines may be traced—one to the Shrecken and others to various tributaries which join higher up. Those at the sides move faster than the central ones—because the reflection of the heat from the boundary rocks is in addition to the direct heat of the Sun, causing the ice to melt away faster; and thus the ice is drawn from the middle to the sides and the moraines become more and more scattered. At last we have only one great lateral moraine with smaller medial ones, and when we behold the beautiful arch at the termination we shall find in the middle of it no fragments at all. There was some difficulty in accounting for this, because it was supposed that the fragments had been caught in the fissures. But why should the extremity be so beautifully free from them? The answer is this: that when a block falls into a fissure it works its way up—not by rising against gravity—but in this way: as the glacier goes down, it continually diminishes at the surface—the upper surface melting away; and the block which had dropped down to a certain distance must continually get nearer the surface. There too this block protects the ice from the rays of the Sun, and you see the mass below unmelted. If the pebble be small it soon becomes heated through, and thus forms a pool or hollow. Thus if the rock be small, we shall have a hollow; if large, the opposite—or the rock will be mounted up on a pedestal. The wind also is one cause of evaporation. The ice wastes away like camphor, without passing through the liquid form.—The general waste of superficial ice tends to bring up the fallen mass toward the surface.

I have said that there was great difficulty in seeing how such large fragments could be so perfectly rounded. Sometimes we have masses perfectly angular—twenty feet in one direction, and twelve or fifteen in the other. There is one, well known to travelers, in the central moraine of the glacier of the Arve. It was here that a hut was built in which a family lived in the summer. The rocks are rounded here, as is said by some, not by the action of the ice, but of the river that flows beneath the ice. But Professor Agassiz says that, as a proof that it is the ice, and not the river, to which the rounding of the rocks is attributable, you may go up to points above where any stream commences, and still you will find that the motion of the ice above has rounded masses of all sizes. This is found so far above the line of perpetual snow that it cannot be attributed to the action of running water.

I mentioned a hut, built by Professor Huge, some time ago. There are some remarkable observations concerning it, which show the rate of motion in these glaciers. It was built in 1827, on the glacier of the Arve. When Professor H. went back nine years after in 1836, he found that the hut had gone down, without being otherwise disturbed or injured, 2200 feet. He went again four years after, and found that it had gone down at twice the same rate. Taking an average of the whole for the thirteen years, it was found that it had gone down at the rate of eight inches in twenty-four hours. In the first part of the distance it went eight, and in the second sixteen; and the motion was entirely in the summer. In the winter, this glacier was stationary, showing again, as Professor Agassiz remarked, that the motion was chiefly owing to dilatation—to this alternate melting and freezing. This is certainly a strong argument in favor of that theory, that it is chiefly during this congelation and melting that the chief motion is observed.

There have been periods when the glaciers made less advance than at others, as between the eleventh and fifteenth centuries; and again in the seventeenth and eighteenth a general motion forward occurred. This period of retrocession and advance is a striking meterological phenomena showing the cycles of climate. When there is a great fall of snow during the winter, which melts in summer, there is an advance.

In Chili, which has the same latitude as the Alps in Switzerland, we have glaciers descending to the sea; but at the Alps they only descend within 3000 feet of the sea level, and this too, although the Andes are only 7000 feet high—half the hight of the Alps in the same latitude. The reason of this singular phenomenon is that to which I have alluded—that the summer heat is less intense in the Alps. In Europe we have to go to latitude 67° before we find a single glacier reaching the sea.—But in the Southern Hemisphere, in latitude 46°—in Chili—we find this occurring twenty-one degrees nearer the equator; so that there is here an actual generation of icebergs in a region which is almost the limit to which the floating icebergs reach. That alternate period of advance and retrocession among the Swiss glaciers is one of the most remarkable facts, and explains many geological phenomena. In observing the terminal moraines of the Alpine glaciers we often find a huge mass left at the end of one summer. Then when the glacier advances again it pushes forward the moraine of the last year into that of the year before, and that into the third, and so on until we have four or five together, forming a huge mountain.—You may see many of these ancient moraines covered with houses, and lofty trees, and various kinds of herbage; and as I witnessed in 1838, when the glacier was advancing, if it approach this ancient moraine it destroys the forests upon it, forcing in the walls of the houses and crushing them by a a slow and almost imperceptible, but, at the same time irresistible, power; and after treading down these lofty trees for a series of years, it will again retreat; and then the wood will grow again, the inhabitants again build their houses, and forget the disaster which once rendered them desolate. So that the trees show by their age how it has been since the ice visited that part of the country.

These phenomena have been well described by M. Charpentier, who remarked that we always have an unstratified mass of large boulders in the same district, the angular and rounded being mingled together. This shows that they cannot be attributed to any action of water, for water exerts an assorting power carrying the finer materials farther than the coarser, and would carry the small stones to farther points than the large ones. Each different size would, supposing the whole to be attributed to the action of water, be arranged in different layers. But ice would carry them all indifferently to the same place, and we should find them unstratified—a promiscuous, confused mass, and that is the character of all the moraines. Now we are not to jump to the conclusion that all the boulders of Long Island are attributable to glaciers. I believe that they are not, but still to the action of ice. The pebbles found at North Haven and along the Connecticut valley, in the boulder formation are rounded on three sides but flat on the other—resting on polished rock; and all the furrows are parallel over a large extent of country. This parallelism does not bespeak the action of water: for in that case there would be none of the scooping out that we see in the action of glaciers; the motion would not be always in the same direction; but if the fragment of a rock becomes frozen in, it is kept in one position, and we should have therefore straight parallel grooves.

But not to dwell longer on the action of mere glaciers, let us pass to the consideration of icebergs. We know that icebergs carry fragments of rock in the same way as glaciers; that is, fragments of rock rest on glaciers when they come to the sea, and are then conveyed away by the floating iceberg, as well as by the moving glacier on land. This has been observed even in latitude 46° in Chili. Scoresby tells us that he met in lat. 69° an iceberg in the Atlantic with 100,000 tons of rock upon it. But in 1839 there was met in the South Atlantic an iceberg 1,300 miles from any known land, from which projected a block twelve feet thick: how much rock was buried beneath the surface was not known. I do not say that this was 1,300 miles from any land—but only from any *known* land. Now as this was floating at a considerable rate from South to North—as it melted the rock would fall to the bottom of the sea, and if the bed should be raised some day, we should have boulders at an immense distance from their starting point. The shores of the Antarctic regions are thus covered with coast ice a mile or two in thickness—stranded ice containing great quantities of rocks. Thus as the glaciers descend to the sea, they float off, the rocks fall to the bottom, and the floor of the ocean is thus strewed over with them, and if the ice melt in still water the formation would be unstratified, because all the rocks fall perpendicularly through the water. But if there were a current, then an assorting power would be exercised, and we should have regular strata.

I now come to a remarkable feature to which I must allude, as I spoke of it at the beginning of my lecture, but of which I can only speak briefly. I mean the appearance of Alpine rocks on the peaks of the Jura. The western valley is composed of talcose granite and gneiss. Then going farther East we come to the Bernese Alps, where the mountains are composed of crystaline limestone, gneiss and other rocks, frequently of highly crystaline marble, fragments of gneiss, &c. Next are the Alps of the smaller cantons, Glaris, Schwytz, Uri, Zug, &c. Now the phenomenon alluded to is this. We have the great valley of Switzerland between the Jura and the Alps. The Alps are from 10,000 to 15,000 feet high, and the Jura only one-third as high. Now we have the same blocks in the plain below, in Lake Geneva and others, perched upon the Jura Mountains, at all hights and of all sizes—one in particular, celebrated under the name of Pierre à Bot, near Neufchatel than forty feet in diameter, composed of gneiss from the Alps. The whole chain of the Jura is composed of fossiliferous limestone, entirely different from the Alpine rocks; so that we have no other resort than to suppose that these rocks must have originated in the Alps. All agree that those on the central part of the Jura came from the Bernese Overland; then, again, the block of slate of the Glaris region sent over its erratics to the Eastern Jura, near Basle, and those on the Western Jura have come from the region of Mont Blanc and the Valais.

Saussure, Van Buch and other writers supposed that these phenomena were produced by some grand rush of waters in consequence of the rise of the Alps from the ocean; a most violent hypothesis contrary to facts now known. If we suppose that this was the cause of these rocks being carried across this great valley, how is it that they did not all fall down into the valley!—How is it possible that they should be whirled sometimes for several thousand feet? This has never been explained to the satisfaction of any one; though to be sure this is rather more satisfactory than no hypothesis. But the remarkable fact is that we have on parts of the Jura fragments of rock such as we must suppose glaciers must have carried straight across the valley fifty miles wide; so that the western stream seems to have followed the course of the Rhone, the Central that of the Arve and the eastern that of the Reuss and the Limmat. But to suppose all this is in defiance of all analogy of the motion of glaciers; for we must remember that they could have an inclination from one bank to the other of only two degrees; so that we should have them moving along a dead flat, which is contrary to all the laws of glaciers, that they should walk across this level and lodge these blocks upon the Jura peaks. I should rather believe this however than that they are owing to a diluvial rush, which is utterly inconsistent with all the laws of the transportation of matter.

There is another hypothesis suggested by the occurrence of glaciers in Chili in the same latitude as the Swiss Alps. We may suppose from geological changes, known to be going on in the upheaval of the land, &c., that the Alps were less lofty than they now are, during the boulder formation, and the Jura also. The sea may then have covered the bottom of that deep valley and the Alps—at one half their present hight—would have stood as high as the Chilian Andes. Suppose they sent down glaciers to the sea, as we know they do in South America, where Sir George Ayres has seen them with blocks of syenite and granite. These might be stranded in the great valley, which, in that case, would represent the channel that now separates the island of Chiloe from the main land. The island of Chiloe is about 100 miles long, and may well represent the Jura Chain. The Andes represent the Alps, and the channel the intervening valley. The Alps at half their present hight, would be sufficient to give rise to glaciers, which, descending to the sea, would become icebergs and float blocks across the channel. In point of fact there are found on the island of Chiloe blocks of syenite in one part and of granite in another, which might have been carried from different points of the sides opposite. Now if an upheaval were to take place on the Chili Coast, which should lift up the Andes—dry up the intervening channel—and lift up Chiloe so that it would appear to be a chain of mountains we should have the same puzzling appearance to future geologists. It would be wondered how these blocks of granite and syenite could have crossed the valley from the Andes and perched themselves on the Chilian Mountains. This hypothesis is infinitely more satisfactory than the one which attributes the phenomena to the extension of glaciers from the Alps to the Jura, or to the diluvial rush of Saussure. There have been found also moraines on the Jura which have polished and scratched the surface—implying that formerly there were glaciers here also. This may have happened when the climate more resembled that of Chili.

I will now state one more fact of some interest here. I observe that Mr. Mather, the State Geologist, to whom was committed the investigation of this part of the country, says that on the Eastern extremity of Long Island are blocks that have come from the neighborhood of the Palisades or from different parts of the Highlands. Traveling farther on he saw another group which came from the Connecticut region opposite; then to trap, porphory and other rocks from New Haven. Still farther were Rhode Island rocks and so in different parts were groups corresponding with strata opposite. In these cases we have not to call in the action of glaciers nor of icebergs to explain this. It may have been caused by the action of coast ice. Ice might float thither carrying these blocks and being stranded lodge its load; then the next year might come a little more. Capt. Bayfield after fixing the position of one block found it carried away several yards. The experience of Dease and Simpson shows the immense power of these icebergs. The Utica, too, which has just arrived talks of icebergs in this latitude, 400 feet high above the water and as there are eight cubic feet below for one above the surface, we may judge of the enormous size of these icebergs which were several miles in circumference. They grate along the bottom of the ocean, ploughing up mud and sand, with a force sufficient easily to move a building like this, or even the whole city of New-York before them! This is the kind of action that produced those contortions of which I have spoken. The top of a sand-bank in the bottom of the sea has been exposed to a violent thrust of this kind and while the strata below remained horizontal, those above would be forced back and folded over upon themselves.

I will now leave this subject half-told, as I have been obliged to leave so many others of equal importance; and still more at which I have not been able even to glance. In concluding I may take this opportunity—as this is the last lecture I shall have the pleasure of delivering in the United States before my return to Europe, being about to resume my geological tour and to visit various parts of the West and of Canada—not only of thanking you for the great attention you have been so kind as to show me but also to acknowledge the welcome which has attended me throughout my tour from Lake Erie to the Savannah river; and which has made me in this country feel as much at home as though I were in England; and I assure you that I shall always look back to the time spent here with a *home-feeling*, which will always make it difficult for me to regard America as a foreign land.

Witchcraft.—The following singular advertisement appears in several papers in York Co., Penn.

Daniel Sulsebarger and his wife are warned not to tresspass upon my property, or to take any thing from it, for I believe his wife is a witch, having found three hair balls in the brutes, which can be proven. Henry Miller.

Effects of the Temperance Movement—There are now but three distilleries working in this City and Brooklyn, (three in this city) and these turn out but about a third of their capacity. The whole produce is about 5,000 gallons per day. The usual quantity in former years was between 25 and 30,000 galls. per day.

☞ The Warning, is the title of a fine engraving in the Mirror for Saturday.

Where is the Money?

To the Editor of the Tribune:

The Comptroller and the People's Money.—The annual expose of this pliant officer exhibits the following:—

"Expenses of visit of Committee to New Haven and Hartford in 1840, per resolution of Common Council"		$497 69
Do.	do to Philadelphia	234 34
Do.	do to Boston	122 34

Making the sum of $854 37!!! The items of which would be interesting, and being in amount at least *four* times as much as was necessary to expend for the *ostensible* object, which appears to have been an inquiry into the pauper and prison systems of these places. The result of the information thus gained, is to be found in a report recommending a re-organization of those departments, the principal features of which are borrowed from former reports, with the exception of the proposition to put each of those departments under the management of *one* man, who is to be controlled by a committee of the Corporation, headed by Lee, the lead man, or some such party tool. There are two strange facts connected with these items of expenditures: the one that money *is said to have been expended in* 1840; the other that this sum of $854 37 *was the exact balance remaining in the Comptroller's hands* from the appropriation of $250,000 for the Alms-House.—In former days when the accounts of a shipmaster with his owners were a little short of balancing, he would add the item of "beef and greens" to square the footing. This act of the Comptroller is quite similar. Tax-payers how do you like it! EXAMINER.

Importance of Manufactures to Farmers.

Correspondence of the Tribune.
Winooski Village, Vt. March 29th, 1842.

Messrs. Editors:—I find in your paper an article under the following caption—"The necessity of Protection to the Farming Interest"—in which I perceive are several errors in the items of expenditure of the Glenham Company—for instance, Oil—"3500 gallons, $4000." Now if the Company have purchased 3500 gallons it must have cost them over $9000. "Teasels—75,600, $1,330." It should be, I think, 756,000, as American Teasels can be bought from 6s. to 9s. per 1000, and to work up 178,000 lbs. wool they must use, if they make any thing like a good article of broadcloth, something less than 1,000,000 Teasels. The item of Pelts also on the face of it looks as though there was an error.

I take the liberty of giving you the several items of expense, from the books of the Burlington Mill Company, in running their large Broadcloth Mill of this place from October, 1840, to the present time, viz:

Wool, 191,161 lbs. *American* Wool, average 42 3-4 cts. per lb.	$81,638 84
Dye-Stuffs, including 4,398 lbs. Bengal Indigo	10,433 71
Oil, 3,314 1-2 galls. Olive Oil and 911 galls. Sperm	4,972 29
Soap, 33,932 lbs	2,877 69
Sig	474 11
Teasels, *American*, 1,521,682	2,095 36
Wood	3,056 84
Insurance	1,992 00
Other Expenses	5,234 23
	112,780 07
Labor, wages to 100 operatives	31,317 02
Total	$144,097 09

From the above statement it will be seen the amount of capital circulated in the immediate vicinity of this establishment, together with the amount paid in your City for Oil, Indigo, Soap, Dyestuffs, and upon some of the items, such as Olive Oil, Dyestuffs, Indigo, &c. the Government receives a large amount of revenue in the shape of duties thereon. The Company are running out their stock with the view of *stopping* their mill unless Congress steps forward immediately and gives the manufacturer that *protection by discriminating* duties that they are *entitled to*. Now, in case this Company do stop, the whole community will feel the loss; not only the Farmer, the Mechanic and Operative, but also the Merchants in the Cities of New-York and Boston—the Transportation Company, and also the *Government itself*. The Farmer is not only a loser by the withdrawal of capital, but is so in another way:—for instance, we have 100 hands, 70 of which are assessed and have to pay their portion of the town taxes, and in case of the factory stopping, they are scattered to the four winds of Heaven.—The Company alone pay nearly one third of the town taxes. The expenses of the town are the same whether there are manufactories in it or not, and therefore the Farmer would be taxed nearly 1-3 more than he now is, and which is heavy enough now.

If you think this worth publishing, and *you* will add to it some forcible remarks that may throw some light upon the subject, that our *Northern dough-faces* may see and be convinced of their consummate folly, you will receive the warmest thanks from a suffering people.

Respectfully your ob't serv'ts
Operatives of the Burlington Mill, Burlington, Vt.
Per JOHN SMITH, Clerk.

A Gentle Hint—The Boston Morning Post meekly observes: "If the loafer who takes the Post every morning from some one of the doors of our subscribers in Mill-street, will be so kind as to take it from one place every morning, we will direct our carrier to leave two papers there."

Singular Malady.—In Braintree, in this State, we learn that a fatal malady prevails, which baffles the skill of the practitioners of medicine in that vicinity. All the particulars of this disease have not come to our knowledge; but we are informed that those attacked suffer severe pain, live but a few days, and after death spots appear upon their bodies. It is remarkable that none but females have been attacked. Only one has recovered, and the spots appeared on her body very slightly during her illness. Quincy Patriot.

☞ **Lyell's Lectures on Geology.**—Published in a neat pamphlet and for sale at this office. These Lectures embrace the following subjects: 1. Fresh Water Formations of Auvergne: Extinct Volcanoes of Successive Periods. 2. Structure of Ætna; Origin of Granitic Rocks; Changes in the Organic World. 3. Upheaval and Subsidence of the Earth's Crust; Submergence and Re-elevation of the Temple of Serapis. 4. Origin of Coal Reefs and Theory of their Circular Form; Coraline Limestone of various Geological Ages. 5. Nature and Origin of Coal; Period of its Formation. 6. Foot-marks of Fossil Animals; The Niagara District. 7. Recession of the Falls of Niagara. 8. Boulder Formation; Transporting Power of Ice; Action of Glaciers and Icebergs. Price 25 cents.

☞ **Richard Adams Locke's** Celebrated Lecture on Magnetism and Astronomy, as reported for The Tribune, is published in a neat pamphlet and for sale at this office. Price 6¼ cents, or 50 cents per dozen.

☞ **Ten Copies** of the Log Cabin, both series complete, neatly bound in one volume, for sale at this office. This work contains a vast amount of Political Statistics of great value, and embraces a complete History of the Political Campaign which resulted in the election of William Henry Harrison to the Presidency, and is continued down to the close of the Extra Session of Congress in 1841. Price $2 50

☞ **A few Copies of the New-Yorker**—Vols. Ten and Eleven, bound, and for sale at this office. Price $2

☞ **The American Laborer**, a work devoted to the interests of American Industry and to the Protection of American Manufacturers and Laborers for sale at this office. Price 6¼ cents.

☞ The April number of the American Laborer is for sale at this office—price 6¼ cents. The second number of this work will be published on the first day of May. The volume will be completed in twelve numbers at 6¼ cents each. Persons desiring to have the volume complete had better send in their names as soon as possible. The entire volume will cost but 75 cents, thus placing it within the reach of all. Mechanics, Laborers, Farmers, you are all interested in the subjects discussed in this volume. Will you patronize it?